

## **Management of Information Technology**

**Tripti Singh<sup>1</sup>, G. P. Chhalotra<sup>2</sup>, Neena Chhalotra<sup>3</sup>, Manisha Chhalotra<sup>4</sup>,  
Rishi Chhalotra<sup>5</sup>, Rajesh Patidar<sup>6</sup>, Ankan Mahant<sup>7</sup> and Jignesh Singhvi<sup>8</sup>**

<sup>1</sup>Indian Institute of Forest Management  
Nehru Nagar Bhopal, M. P., INDIA.

<sup>2</sup>Retd., Prof.,  
EE, Govt. Engg. College of M. P., INDIA.

<sup>3</sup>IT Engineer Specialist,  
Atlanta, U.S.A.

<sup>4</sup>Atherwa College of Management,  
Mumbai, M.S., INDIA.

<sup>5</sup>Computer Engineer,  
Oracle Corporation, Atlanta, U.S.A.

<sup>6</sup>Computer Engineer,  
Opennet Atlanta U.S.A

<sup>7</sup>Shri Govindram Seksaria Institute of Technology & Science  
23, Park Road, Indore, M.P. INDIA

<sup>8</sup>Business Analyst  
NSE - IT, Mumbai, M.S., INDIA

(Received on: 12 April, 2014)

### **ABSTRACT**

Information technology is rising day by day but it is spread in a large spaces of the study and practice. A number of experts and researchers are busy to make IT, in a well organized and systematic systems. The authors are also not satisfied with this study due to a large random statements and devices used in information technology. Statements and devices used in information technology. Some attempts are made to increase the literature in the IT plate form. A simulation is made to understand the IT plate form. A simulation is made to understand the IT in a simple and easy manner. Information technology in the initial state was CBIS and MIS Now it has increased in all spaces of the organization and the society some statements are organization and the society some statements are collected from the literature and their study is made regarding the failure rates.

The failure rate is a fuzzy variable and its fuzzy grade of truth can be calculated using exponential distribution function. The reliability a gave parameter of a system can be explained in terms of faults, mean between failures, probability of failures, Risk, hazard, damages, calamity and the disaster. Reliability methods can bring a systematic presentation of organization, management and administration of the IT systems. The

subject is not well defined in a firm of discipline. Some ideas are fuzzified and then defuzzified to study reliability attributes IT.

**Keywords:** Information technology, fuzzy environments, reliability attributes.

## INTRODUCTION

Information is a resource like other resources land, labour, capital and organization. Information is a money and it has functions four medium, measure, standard and store. One may get required information immediately on the internet. Information technology is an engineering full of techniques, methods, procedures and organization. Ratio, T.V., Cinema, Postoffice, Telegraph office, employment Ex Change and many like wise are information centres. Office automation (OA, MIS, CBIS, DSS, AI, ES, etc. may be components of the IT. Computers of all kind connected on internet form a part of IT. Work wide wed (www) is a part of IT. One may get any thing from any corner of the world today through information technology. E-commerce, E-Government, E-business and all other electronically controlled system for IT are part of this study.

A literature given in the references is collected to study the IT at new angle of reliability attributes. Reliability may bring several, subtle parameters of the IT. The information technology is very old system of control and information. Information is generated using data and statistical surveys of data can be made collected.

### 1. Future of Information Technology

Future of information technology, prospectus and challenges with a special reference to Indian context are under investigation. The information technology is a comfort and equivalent to a money therefore IT can be easily accepted by the society. The society acceptance is the major factor in the recognition of a system. It is difficult to describe this type of goal of IT and objective of the society. One can form a fuzzy system to describe IT under fuzzy logic spaces, In space-I.

#### Space – I

Fuzzy elements	$\mu\hat{A}(\lambda)$	$\lambda$	$\lambda R$	Sec	T	A	M
History of computers telecommunication and electronics	.779	.2497	.19454	.8054	4.0048	.766	.789
Initial development of CSE in India	.886	.12036	.16723	.827	8.26	.866	.873
Role of Academics in CSE and IT	.736	.30652	.2256	.7744	.3262	.766	.723
Present scenario it an Integrated approach in India	.866	.1438	.1246	.8754	6.954	.852	.839
Case studies	.792	.2332	.1846	.81563	4.288	.766	.759
Critical analysis of R and D in Indian IT	.916	.0877	.08036	.9196	1.402	.903	.908
Strategies of future IT developments and their implementation	.756	.28236	.2129	7.87	3.5415	.744	7.36
Impact of globalization IT	.592	.5242	.31035	.6896	1.9076	.543	.562
Forecasting for next 20 years of information technology	.766	.26656	.2042	.7958	.3755	.743	.752

Space – I produces a fuzzy hamming distance 7.087 with nine: element and relative Fuzzy Cardinality would be:

$$\|A\| = \frac{1}{2} \int_1^n \mu\hat{A}(\lambda) d\lambda = 0787444 \quad (1)$$

$$\text{at the failure rate } \lambda = \frac{\log e \mu \hat{A}(\lambda)}{0.4343} = .2389594 \quad (2)$$

$$\text{and MTBF} = 4.1848109 \quad (3)$$

## 2. History of Information Technology

History of computers, telecom and Electronics can be developed on the ground of industrial revolution till 1900. There was a great rise of eastern countries in information technology firm 1900 to 1945 to 1990 there was a period of convergence products. From 1990 till date may be a saturation in US, EU and for east countries. There is an inter relationship of IT with the telecom and electronics which is not properly known in the utilities. The recent

history of the IT is also known properly and many people make random statements and uncertain about the future of the information technology. One can fuzzify these statements I depending on the field data in space-II. The space II has seventeen elements. The history is resolved into seventeen component each component is assigned a fuzzy grade of truth depending on the linear, non-linear, sigmoidal or binary activation with the time. The variation of the fuzzy grades of truth may be in five modes exponential linear hyperbolic, sigmoidal binary threshold or square function one can assign the grades according to the experience and working with IT systems. There is a slow progress of the IT in India.

Space – II

Fuzzy elements	$\mu \hat{A}(\lambda)$	$\lambda$	$\lambda R$	Sec	T	A	M
Role ply by various agencies in Indian Information technology	.836	.1792	.1497	.8502	5.582	.81	.823
1977 till – 1990	.844	.1696	.143	.8568	5.816	.822	.831
IITS and IISC	.753	.2836	.2136		.7863	3.926	.711
DOE	.816	.2033	.1659	.834	4.9188	.801	.806
NIC	.592	.5242	.31035	.6896	1.9076	.588	.576
CDAC=PARAM	.776	.2536	.968	.8032	3.943	.766	.732
Engg. College	.446	.8074	.366112	.6398	1.238	.433	.422
ISRO	.523	.64816	.3389	.66	1.542	.449	.486
URDU	.712	.3396	.2418	.7581	2.944	.706	.703
CSIR	.816	.2033	.1659	.834	4.9188	.799	.792
Private Sector	.889	.1176	.1046	.8954	8.5034	.866	.856
Decentralized efforts	.792	.2332	.1846	.8153	4.288	.776	.766
Availability of product and technology	.623	.4732	.2948	.7052	2.113	.611	.622
Boom period of 99	.892	.11428	.094	.898	8.7504	.886	.876
2000 – till date	.916	.08773	0.8036	.9196	11.398	.896	.887
The set backs	.723	.3243	.23446	.7655	3.083	.71	.712
Lesson from the set back	.629	.4636	.296	.7083	2.57	.611	.619

The space II generates a fuzzy cardinality of 2.578 with an integration of all the Fuzzy points. The fuzzy membership

functions may be sigmoidal whose differentiation may be probability thus  $IAI =$

At the failure rate = 3013715 and MTBF = 2218163. The R.S.K.R, security (Se) and MTBF (T) can be expressed as cardinality and relative fuzzy cardinality using center of are (COA) method or mean of moment method (MOM) method.

### 3. Initial Development of CSE in India

There was a time of cold war regarding Computer Science and Engineering in the society and industries. Society was reluctant to accept the computers. Still in India the e-Government is failure. Most of the Banks have accepted the computers. Mostly governments made efforts through academies, laboratories and industries in favour of computer science and engineering. There was certain weakness in hardwares and software products in the fields.

A strength of software services were increased before 1970 and afterwards entry of intel with 4004, UC was noted. In 1981 there was launch of IBM PC for the engineering society. There were rapid progress of IT from 1981 to 1990. After 1990 there were open environment of architecture of PARAM series of super computers by CDAC. The defense was a heavy user of software codes in the vising time of IT. There were a rapid progress in the field of microprocessors and micro computers but not for the information technology. The above narrative models in split into twenty components and a Fuzzy grade of truth obtained would be 0.887 at the failure fate  $X = .199$  and MTBF is 8.3396 years. The initial development MTBF is 8.3396 years. The initial development took 8 years to develop fast and stopped, eventually.

Space – III

Fuzzy elements	$\mu_{\hat{A}}(\lambda)$	$\lambda$	$\lambda R$	Sec	T	A	M
Teach education area mostly on software side	.712	.3396	.2178	.752	2.46	6.99	.696
Microprocessors advanced	.892	.11428	.10194	.898	8.79	.886	.869
Software engineering	.886	.2036	.10723	.8927	8.262	.866	.856
Date Communication	.792	.2332	.1447	.8153	4.288	.766	.779
Computer Network	.811	.2094	.16989	.830	4.775	.801	.806
Computer Design	.711	.34107	.2425	.7575	2.932	.698	.688
Programming Languages	.612	.49101	.3009	.6995	2.03666	.592	.588
Computer Architecture	.736	.30652	.2256	.7744	3.2624	1.70	.723
Parallel processing Architecture	.776	.2497	.19454	.8054	4.0048	.766	.754
Digital Signal processing	.836	.7912	.1497	.8502	5.582	.811	.826
Unix – Lumix, Windows Novel	.733	.3106	.2276	.7703	3.225	.722	.713
Oracle, VB, C++, RDBMS, Website Designing	.639	.4478	.2861	.7138	2.233	.61	.622
Graphics and Multimedia	.592	.5242	.3035	.6896	1.907	.588	.577
Artificial Intelligence	.86	.2033	.1659	.834	4.918	.807	.808
Cellular – Mobile communication	.712	.3396	.2418	.758	2.9446	.699	.687
Computational Numerical Analysis	.669	.40196	.2689	.73108	2.4878	.633	.632
Discrete Systems	.799	.2244	.1792	.8207	4.456	.788	.766

### 4. Application of Information Technology in a Big Way

The period 1984 to 1989 was a big way of information technology, Doordarshan

transmitters were not applied in the period of Indira Gandhi but she started large number of Radio and TV stations. There was a big start of IT in the period of Indira Gandhi. In 1990-91

there was end of cold-war and USSR dismantled the system. In the beginning of Liberalization abundance of all sorts of information technologies in all sorts of areas were started. Computerization in rural and remote areas was started by NIC. The Indian Railway reservation was started in 1977 and it came to full swing in 1980. All the IITS and IISC started the research and studies on IT systems. All academic Institutions started thinking about the IT.

One may find from a survey in Space-III for the progress of information technology in sequence from 1980 to 2000. The computer systems and IT have caught a momentum how to make the work one unit. All the cities are connected by the roads and the World Wide Web (www). This progress and development may be found rising a graph. There are seventeen elements of the application made of the IT simulated in space-III. The fuzzy grades of truth may be found by fuzzy functions such as activation's in the form of non linear sigmoidal threshold, hyperbolic and binary. There are derivatives for them and they may be in the form of probability functions.

#### **For the space III one may find that**

The application of big way of IT could stand for four year only and there was a big change in the style of the IT after words. The nature of the change and failure are determined by plotting the fuzzy grades of truth with the failure rate. The reasons of failure rate are investigated.

#### **5. Role of Academic Systems**

There may be three types of roles of academic system, Mandatory role, Additional role and Advanced role. The course designing and teaching is the first need of this role. There should be a good result and quality of the education and the result. There must be an improvement of the students. The additional

role has five components administration, research training development and other activities such as organization and management. The advanced role may be for hardcore R and D. there should be an enterprisership development in the organization. There should be major R and D projects in the academic systems for the students and teachers. Student must be trained to write the papers and make research in small projects. There should be a provision for M. E. and Ph.D. For advanced thesis work, information technology, there are a few departments in the universities to conduct research work at M.E. and field of IT. A very random literature is available in the field of it and no good books are found at present in this discipline. This narrative model is Fuzzified taking 20 elements and then defuzzified to obtain a fuzzy cardinality 17.72 and relative fuzzy cardinality 0.886 at failure rate  $\lambda = .12103$  and MTBF 8.262 years.

#### **6. Present Scenario of IT in India**

For a study of present scenario of IT in India an integrated approach is required. One should study the major work of software services. There is a development of information technology enabled services in India where large number of skilled workmen are employed by other countries. There should be availability of maintenance services for ITES and software groups. There are software products in minor level, and hardware at very minor level, at present.

The factors responsible for scope of software services are to be analysed in the light of markets and society demands and supply. There must be favourable time zone with respect to US the largest market. Skilled manpower at very cheap rate is available in India. There is a good connectivity to the systems through internet for a global discipline

and work culture there should be union of south Indian states, Bombay, Delhi, Chennai, Hyderabad cities and states.

There are development of ITES called information technology enable services. There are call centres development due to good English and cheap man power available there is a competition in future among the developing countries from eastern side. At present there is

no application of software skill in India. Market is not established well for them and supply of the software and hardwares. Although no major software products are known in India, some World famous products are available in the map.

Some famous software products are surveyed in the information technology space-IV.

#### Space – IV

Fuzzy elements	$\mu\hat{A}(\lambda)$	$\lambda$	$\lambda R$	Sec	T	A	M
Oracle software product	.889	.1176	.1046	.8954	8.203	.876	.866
SAP R/3 product	.866	.1438	.1246	.8754	.954	.833	.844
Adobe (PM)	.92	.09211	.084	.916	10.856	.899	.886
Sun micro systems Microsoft	.932	.07042	.0656	.9343	142005	.91	.923

The space-IV, very difficult for this analysis due to small fuzzy points. This may yield a fuzzy cardinality of 4.495 and relative fuzzy cardinality 0.899 at the failure value  $\lambda = .10647$  and MTB = 9.2922389 years. The fuzzy element x will be

$X = (10647, .899) = (x, \mu(x)(x))$  where  $\mu\hat{A}(\lambda) = \mu(x)$  varies between 0 to 1. The failure rate of IT is complicated and very fuzzy in nature. This growth will work for ten year of period only.

One can find the reliability attributes of IT using Integrated approach as follows in Space-V.

#### Space – V

Fuzzy elements	$\mu\hat{A}(\lambda)$	$\lambda$	$\lambda R$	Sec	T	A	M
Integrated approach	.866	.1438	.1246	.8754	6.954	.833	.845
Required to look into following aspects	.912	0.921	0.84	.9169	10.85	.896	.893
Hardware	.886	.121036	.1072	.89276	8.262	.867	.877
Software products	.912	.092	.084	.96	10.85	.896	.886
Net working	.892	.1428	.1019	.898	8.79	.866	.872
Telecommunication	.796	.228	.186	.8184	4.384	.776	.768
Comergence	.779	.2497	.1949	.8054	4.24	.755	.756
Embedded system	.786	.2408	.1892	.8107	4.52	.726	.768
Intectromics	.892	.1142	.10194	.898	8.7565	.877	.866
Digital	.877	.1312	.1151	.88148	7.622	.856	.862
Blue technology	.887	.1199	.10636	.8936	8.37	.877	.867

Space-V has eleven elements giving in Fuzzy cordiality.  
IIAII = .8622727

At the failure rate  $\lambda = 1481817$  AW  
MTBF = 6.7484677 year The risk hazard.  
Damage, calamity and disasters may be found

in the fuzzy set. The fuzzy cardinality of all the variable  $\mu$ ,  $\lambda$ ,  $\lambda R$  sec T. A and may be found. The A and M stand for availability and main

trainability respectively, these are essential parameters of reliability.

Space – VI

Fuzzy elements	$\mu\hat{A}(\lambda)$	$\lambda$	$\lambda R$	Ce	T	A	M
Technology	.779	.2497	.945	.8054	4.0048	.776	.758
Mechanical Devices	.669	.4026	.2689	.7308	2.483	.611	.633
Vacuum Tubes	.733	.3106	.2276	.7723	3.225	.712	.722
Transistors	.896	.1098	.0984	.9016	9.1066	.886	.879
Medium scale integration	.912	.092	.084	.09169	10.856	.896	.887
Large scale integration	.926	.0768	.07119	.9288	13.0208	.911	.926
Very Large scale integration	.962	.0387	.0372	.9627	25.839	.933	.936
Optical Devices	.976	.0243	.0237	.9763	41.152	.962	.956
Software	.886	.121036	.10723	.89276	8.262	.8667	.854
Machine language	.792	.2332	.18968	.8153	4.288	.776	.782
Assembly language	8.12	.1948	.16031	.8396	5.334	.822	.831
High level languages	.823	.1948	.16031	.8396	5.1334	.822	.831
LISP-PROLOG	.839	.755	.1442	.8527	5.698	.812	.798
Fourth generation languages	.846	.16723	.14148	.8585	5.9797	.823	.836
Objective oriented languages	.855	.5665	.1339	.866	6.836	.822	.816
Distributed languages Java	.866	.1438	.1246	.8754	6.9541	.833	.852
Natural language	.877	.1324	.1151	.8848	7.62	.866	.856
Architecture	.867	.427	.1237	.8762	7.07	.833	.842
Uni processor	.876	.1323	.1597	.884	7.588	.852	.840
Array processor	.876	.1323	.11597	.884	7.558	.852	.846
Array processor	.9116	.08773	.08036	.9196	11.398	.896	.889
Special purpose chips	.921	.0823	.0758	.9272	12.15	.911	.912
Super Computers	.932	.7042	.0656	.9343	4.2	.922	.926
Parallel computers	.944	.0576	.0544	.9456	17.36	.932	.931
VLSI Array processors	.956	.0449	.043	.9569	22.27	.932	.916
Parallel Distributed processing	.0449	.06613	.06206	.938	15.121	.912	.898
Optical computers	.916	.0877	.08036	.9196	11.402	.896	.886
AI concepts	.892	.11428	.10194	.898	8.79	.866	.876
Numerical processing	.916	.08773	.08036	.996	1.398	.892	.889
Symbolic processing	.926	.07688	.07119	.9288	13.072	.906	.908
General problem solving logic	.913	.09101	.08309	.9169	10.987	.893	.886
Heurishe Research	.908	.0965	.08763	.912	10.362	.886	.879
Computation linginsite	.906	.0987	.0894	.9105	10.13	.836	.847
National language processing	.892	.142	.10194	.898	8.7	.833	.842
Knowledge representation	.886	.121036	.10723	.8927	8.262	.866	.862
Expert systems	.876	.1323	.11597	.884	7.555	.822	.812
Hidden Markov models	.792	.2332	.1846	.853	4.288	.776	.768
Antificial Neutral networks	.892	.11428	.10194	.898	8.75	.866	.877

The defuzzification for output must represent a weighted, voted and most suitable solution. There are a number of defuzzification techniques one of them is the centered method in four types Center of gravity (COG), Centre of weight (COW), Centre of largest area

(COA), center of mass of highest intersection region. There is one more method in three types. Mean of maxima maximum possibility and left right maxima. The centre of gravity method may good.

$$\mu_{\hat{A}}(\lambda) = \frac{\int \mu_{\hat{A}}(\lambda) \lambda d\lambda}{\int \mu_{\hat{A}}(\lambda) d\lambda} = .08787$$

$$|\hat{A}| = \int \mu_{\hat{A}}(\lambda) d\lambda = 32.512 \text{ and}$$

$$\|\hat{A}\| = \int \mu_{\hat{A}}(\lambda) d\lambda = .8787$$

$$\text{at the failure rate } \lambda = \frac{\log_e \mu_{\hat{A}}(\lambda)}{0.4343} = .129307$$

$$\text{and MTBF} = 7.7335323 \text{ year}$$

The practical approximation to solve the problem would be

$$\mu_{\hat{A}}(\lambda) = \frac{\sum_{i=1}^n x_i \mu_0(x)}{\sum_{i=1}^n \mu_0(x)} = \frac{\sum_{i=1}^n \lambda_i \mu_0(\lambda)}{\sum_{i=1}^n \mu_0(\lambda)}$$

## 7. Essential Output

The essential output of the I.T. may be hard word manufacturing, major application of softwares good support services, project implementation skill and system integrate L.M. These items are analyzed in the fuzzy space firm 1930 formed using the fuzzy elements. The fuzzy set yield a reliability 0.839 at the failure rate  $\lambda = 175523$  and MTBF = 569663 years.

## 8. Case Studies

The case study can be found in a following fuzzy set given in space-VII.

Space – VII

Fuzzy elements	$\mu_{\hat{A}}(\lambda)$	$\lambda$	$\lambda R$	Ce	T	A	M
Case studies	.836	.179	.1497	.8502	5.583	.811	.802
Main frame systems IBM	.886	.121036	.1072	.8927	8.262	.866	.853
Major main frame manufacturer	.852	.16016	.364	.8635	6.243	.833	.826
Intel	.892	.11428	.1019	.898	8.79	.863	.872
The chipmaker provided the vital chipset and processor for PCS	.876	.323	.11597	.884	7.558	.852	.899
Microsoft IT happened	.866	.1438	.1246	.8754	6.954	.822	.831
Unix A planned OS	.892	.1142	.10194	.898	8.756	.866	.857
IBM pcs a huge break through	.886	.121036	.10723	.892778	.262	.853	.836
Linux: A freedom movement and above all	.779	.2497	.1945	.8054	4.00	.733	.762
Internet	.892	.1428	.1019	.898	8.79	8.66	.812

The fuzzy space VII is 8.657 and relative fuzzy cardinality .8657 at the failure rate .1443 and MTBF 6.93 this a change occurred after seven years of period in this system of elements.

The fuzzy logic neurologic artificial intelligence, experts system and probability theory may predict the future of the information technology obtained through computer based information systems (CBIS) and management information (MIS).

The organization management administration are basic tools to develop a system systematically and sequentially there is no sequence of progress and development in the information technology. The organization, management and administration are yet not well defined for IT systems. There are several techniques to simulate IT systems.

### (a) Microsoft

Microsoft started as a small DOS version



a stripped down version of unix like comm. and with a single user system. It has got a grand succession the Microsoft more than it planned. Information technology is not intended to be used in bigger systems because there are data centres. A64BIT OS version from MS Windows with 32 processor support present. There was a thinking in initial state the causes of unstability was due to Windows OS but now windows are helpful in IT Spaces.

Information technology is a proprietary limited briars are applied and full codes are limited to one person. There is no community base support is available. There are short

coming of inbreeding and commercial thinking. This narrative model is formed to study reliability of Microsoft and IT in the spaces of fuzzy environment. This may yield a reliability of 0.8776 at the failure rate  $\lambda = .305627$  and MTB = 7.664. The peak limit of the Microsoft remains for 8 years only.

## 10. IBM PCS

This planned a way of distributed computing. The PCs become a common device for information technology. The following components added in value PC, space-VIII.

Space – VIII

Fuzzy elements	$\mu\hat{A}(\lambda)$	$\lambda$	$\lambda R$	Ce	T	A	M
Audio systems	.776	.2536	.968	.3033	3.943	.754	.762
Video systems	.886	.121036	.10723	.892	8.262	.792	.866
Multimedia	.712	.3396	.248	.758	2.94	.692	.688
Office productivity	.662	.4142	.273	.727	2.42	.62	.644
Calculations	.736	.3065	.2255	.774	3.26	.711	.723
Programming	.886	.121036	.10723	.8927	8.262	.844	.856
TV-Planning	.792	.2332	.1846	.8133	4.288	.788	.776
Telecommunication	.892	.1142	.10194	.898	8.75	.877	.866
Internet	.796	.2281	.1816	.8184	4.384	.766	.787

The space VIII can be fuzzified by a formula

$$\mu(\lambda) = \frac{1}{1 + \left(\frac{\lambda}{K_2}\right)^{-K_1}} \lambda e x$$

Where  $K_1$  and  $K_2$  are called exponential denominational fuzzifiers respectively. The fuzzy cardinality is a check of the results. The reliability of space VIII, would  $R=79311$ .

SAP R/3 implementation shows modification of mainframe ERP on PC level from SAP R/2. The internet revolutionized the whole world for information technology.

IBMPC may yield a reliability according to fuzzification of nine fuzzy points in a universe of discourse of failure rate  $x$ . This

simulation is simple but failure rate calculations are difficult. The failure rate may be in management and devices. This may give us a vague idea of the progressive steps.

## 11. LINUX and Internet

This system open up a way for open source code model. Inter brought X-86 open architecture and LINUX brought open source code culture. India must adopt information technology in a big way. Open source code involves many people and engineers to produce more an more productive sources and fast grooming. Internet provided gate way to international software market. LINUX promises to bring more software services opportunities in India. This is a narrative model and

fuzzification may be made to find the fuzzy grade of truth of the set this may yield a fuzzy grade of truth 0.8896 at the failure value  $\lambda$ .1169818 and MTBF, 8.548 years. This worked for 9 years only.

## 12. Analysis of R and D for Indian IT

There was a lack of consistency in selecting R and D models of information technology. The education mode is that of British Pattern. The knowledge based and skilled based expert systems are taken from USA and other European countries. Most of the European countries workers took part in the information technology systems. Russian, Japanese, American and Australia were busy in trying to develop the models and efforts. No new models were developed by R and D sector for IT progress and strategic planning. R and D sector took too many areas together for the researches. A turn was taken by R and D after 1990. Very few systems focused on generic

technology, neural networks and fuzzy systems. USA mostly focused on these techniques. The hardware sector is still neglected in Indian society.

There was a very weak link between academic, laboratories and industries. There was negligence of reverse engineering methods in IT spaces. There is a failure in engineering and medical system due to no consistency among several systems.

There is a great availability of choices of technologies in globalization which are not availed by Indian experts. There is no importance given to the indigenous software and hardwares in India. Every thing is taken as copying from well known establishments. The R and D sector must think again for their own models and technology.

This system is fuzzified and then diffused to find the consequent of the set in the form of fuzzy grade truth  $\mu_{\hat{A}}(\lambda) = 0.8776$  at the failure rate  $\lambda = 1305627$  and MTBF = 7.65915 years.

Space – IX

Fuzzy elements	$\mu_{\hat{A}}(\lambda)$	$\lambda$	$\lambda R$	Cec	T	A	M
Hardware	.876	.1323	.11597	.884	7.558	.886	.853
OS product	.779	.2497	.1949	.8054	4.048	.766	.754
Software product	.889	.1176	.1046	.8954	8.503	.867	.863
Application product	.866	.1438	.1246	.8754	6.954	.844	.836
Software services	.669	.402	.2689	.731	2.487	.622	.633
Advance software services	.592	.5242	.3103	.6896	1.907	.559	.523
Allied services	.82	.2082	.1691	.8308	4.803	.792	.786
Fixed Target Base	.836	.791	.1497	.8502	5.983	.811	.822
Generic calculations	.762	.278	.2071	.7923	3.679	.722	.733
Connectional Branches	.636	.4525	.2878	.7121	2.209	.611	.622
Speed requirement	.766	.2665	.2042	.7958	3.752	.752	.744
RAM requirement	.829	.1875	.1554	.8445	5.333	.811	.792
32 BIT – 64 BIT	.769	.262	.20198	.798	3.808	.711	.723
IPS	.632	.4588	.2899	.71	2.179	.611	.622
Software	.773	.2574	.1990	.80	3.885	.766	.755
Voice	.816	.2033	.1659	.834	4.918	.799	.787
Call centers	.593	.522	.3098	.6901	.9057	.533	.545

## 13. Strategies of Future IT Developments and their Implementation

New strategies are needed for the future development to ascertain the existence of

information technology in India. There must be a sustainable development in product and services and there should be no roll back. The employment potential should be increased.

There should be a development of indigenous market, capital and investment. One should reduce dependency on hot demand and hot money. There must be a stability of branch engineering similar to the traditional engineering branches like mechanical, electrical and civil engineering. There must be a counter measure for artificial intelligence. There is a great need of strong foundation of IT education similar to other engineering branches one should adopt sharp objectives and integrated

approach like the medical disciplines. A fuzzy set is presented as following space-IX.

The space nine may produce reliability .7585 at the failure rate  $\lambda = .276370$  and MTBF = 3.618335 years. This should be done with 4 years of span.

One can form a fuzzy set for impact of globalization on information technology in space-X.

#### Space – X

Fuzzy elements	$\mu_{\hat{A}}(\lambda)$	$\lambda$	$\lambda R$	Sec	T	A	M
Possible threats	.792	.2332	.1846	.8153	4.288	.755	.766
Competitions	.93	.0911	.083	.9169	10.987	.906	.908
From Europe	.892	.1142	.10194	.898	8.756	.886	.879
Eastern European countries	.886	.12103	.10723	.89278	8.262	.886	.862
SAP R/3 A product of	.812	.2082	.1691	.8308	4.803	.791	.788
Germany	.826	.19115	.1578	.8421	5.231	.811	.821
Germany largest vendor	.816	.2033	.1659	.834	4.918	.776	.803
Software products and	.889	.1176	.1046	.8954	.8503	.862	.872
Related services	.832	.18392	.15302	.8469	5.437	.812	.821
Eastern side	.692	.3681	.2547	.7452	2.716	.662	.673
Taiwan Hardware	.776	.2536	.1968	.8032	3.943	.744	.736
China Hardware	.667	.4036	.2701	.7298	2.465	.633	.652
Service in English language	.882	.1255	.1107	.889	7.968	.862	.853
Philippines	.916	.0877	.0836	.9196	12.44	.899	.886
Thailand	.923	.0801	.0739	.926	12.48	.911	.922

The globalization many add a reliability of 0.8373 at the failure rate = 1811998 and MTBF 5.5187674 year. This is a systematic simulation one may represent a sequence of the progress. Fore casting for next twenty years of the information technology in form of a fuzzy set with a failure rate as fuzzy variable. This is represented in space-XI.

The forecasting vector may produce a fuzzy reliability 0.8202307 at the failure rate  $\lambda = .198167$  and MTBF 5.046248 years. Freasting has a fuzzy grade of truth 0.8202307 and it may have life cycle 5 years. The

Fuzziness in the forecasting may be obtained by calculating the intersection and union of the two sets, one is given in space eleven and other will be complementary function of this set.

$$E = \frac{A \cap AC}{A \cup AC} = Fuzziness$$

Fuzziness varies from 0 to 1. If E=0, than there is no Fuzziness and average will be the satisfactory result. It E=1 then full fuzziness and it requires – Plotting the failure rate and A (x) for Fuzzy set a and its complimentary function Ac and the intersection may give a better result. One may simulate a fuzzy set in space XII to represent a protection.

**Space – XI Fore Casting**

<b>Fuzzy elements</b>	$\mu\hat{A}(\lambda)$	$\lambda$	<b>XY</b>	<b>SE</b>	<b>T</b>
There will be a common use	.796	.2281	.1816	.8184	4.384
64 Bit system by 2010	.866	.1438	.1246	.8754	6.9541
Prices of PC will below	.562	.5762	.3238	.6781	1.7355
Tape recorder will be cheap	.623	.4732	.2948	.7052	2.1132
Reliable network of very	.776	.2536	.1968	.8032	3.9432
Low cost	.869	.1404	.12201	.8779	7.1225
Similar to Electricity supply 2010	.892	.11428	.10194	.898	8.7504
Similar to Water supply 2010	.869	.14041	.12201	.8779	7.122
Embedded items common	.736	.3065	.2256	.7744	3.2626
House hold items common 2015	.776	.2536	.1968	.8032	3.9432
Open architecture hardware	.866	.1438	.1246	.8754	6.954
will be common	.889	.1176	.1046	.8954	8.5034
Open source code very common	.812	.2082	.1691	.8308	4.803
Similar to languages	.822	.19601	.16112	.8388	5.1017
Universal mpe key board	.896	.1098	.0984	.9016	9.1074
Universal standards	.812	.09211	.084	.916	10.856
Similar to English movie	.816	.2033	.1659	.834	4.918
will be dubbed in hindi	.832	.1839	.15302	.847	5.437
No need of learning English language	.567	.567	.3217	.6783	1.7636
More user friendly	.679	.3871	.2628	.7371	2.5833
Extremely easy to use Internet protocol IP6	.816	.2033	.1659	.834	4.9188
will come	.886	.12036	.10723	.8927	8.262
Fully convergence of Telecom	.866	.1438	.1246	.8754	6.954
PC	.877	.1312	.1151	.8848	7.622
Multimedia	.892	.11428	.10194	.898	8.750
Audio	.913	.09101	.08309	.917	10.98
Video	.926	.07688	.07119	.9288	13.0072
Instrumentation	.936	.06613	.062	.938	15.121

## Space – XII

Fuzzy elements	$\mu_{\hat{A}}(\lambda)$	$\lambda$	$\lambda R$	Sec	T	A
Protect our interest	.892	.1142	.1019	.898	8.756	.886
Bready for through	.912	.0921	.084	.916	10.85	.896
Completion	.886	.121036	.1072	.892	8.262	.866
Long term planning	.776	.2536	.1968	.8032	3.9432	.766
Integrate planning	.792	.2332	.1846	.8153	4.288	.788
China Function	.836	.1791	.1497	.8502	5.583	.811
Emphasis on Hardware	.799	.2244	.1792	.8207	4.456	.768
Emphasis on Electronics	.836	.1791	.1497	.8502	5.58	.823
Interpreted approach	.592	.5242	.3103	.6896	1.907	.566
Reduction of dependence	.696	.3642	.2522	.7472	2.76	.623
Indigenous market	.797	.2269	.1808	.819	4.407	.788
India develop specific method	.832	.1839	.15302	.847	5.437	.811

The space XII has twelve fuzzy points at the failure rate  $y$  which is a fuzzy universe of discourse. One can adapt a logic of medium, mild, harsh and severe failure rates in the technology and efforts. The fuzzy cardinality.

$$|A| = \int^n \mu_{\hat{A}}(\lambda) d\lambda = 9.646$$

and  $\|A\| = 803833$  and  $\lambda = .21836$   
MTBF = 4.57958

## DISCUSSION

Fuzzy logic may be fruitful when one assigns the grades to the statements and calculated from empirical formulas. Fuzzy logic is used for the data which have no reference, context and origin. One can find fuzzy cardinality, and relative Fuzzy cardinality of Fuzzy points.

Failure rate is a natural phenomenon and it occurs in all the parts of the activities and events. The law of diminishing return and bath tub curve of failure rate may be applied to the systems, large number of statements and phrases one collected to study the reliability. The efforts made are vague and still fuzzy. The reliability is a Fuzzy cardinality of large number of characteristic parameter.

One may find failure rate first and then their fuzzification can be made. Crisp graph and

fuzzy graph may be plotted separately using binary activation and sigmoidal activation. Defuzzification is a difficult problem but fuzzy cardinality method is simple one.

## REFERENCES

1. Neena Chhalotra, *et al.*, "Study of reliability attributes of general system model of firm under CBIS and MIS using Fuzzy logic" International conference on energy automation and information technology IIT Kharagpur India, December 10/12/2001. Proceeding of conference pp. 884-884.
2. Neena Chhalotra, *et al.*, "Information technology a selective job for modern women in India. Paper No. 02030 (2D) AMSE, France December, 20, 2002.
3. Neena Chhalotra *et al.*, "Study of reliability attributes of Information technology and their failure rates" Paper No. 02368 (1 B), AMSE France, December 20, 2001.
4. Neena Chhalotra *et al.*, "Reliability of Information technology using Fuzzy logic techniques" Antrodya, SSSIST Sehore, April 24-26, 2002, Seminar proceeding.
5. G.J. Kliv and T. A. Folger. "Fuzzy sets, uncertainty and Information" Prentice Hall Englewood Cliff, J. J. 1988.

6. B. Kosko. "Fuzzy Entropy and conditioning" *Information Science*, Vol. 40, 1986, pp. 165-74.
7. E.H. Mamdani. "Application of Fuzzy logic to approximate reasoning using linguistic synthesis" *IEEE Transactions on computer*. Vol.C-26, No.12, December 1977, pp. 1182-1191.
8. C Mead. "Analogue VLSI and Neural Systems" Addison-Wesley Reading, MA, 1989.
9. N. Reschev "Many Valued logic M. C. Graw hill, New York, 1969.
10. J.B. Rosser and A.R. Turque. the "Many Valued logics" North Holland, New york, 1952.
11. J.A. Aderson "Cognitive ar,d Psychological computation with nevrnal models" *IEEE Transactions on systems, Man and cybernetics*, Vol. SMC - 13. September-October 1983, PP 799-R 15.
12. G. Mathai and B.R. Upadhaya "Performance Analysis and applications of the Bidirectional Associative memory to Industrial spectral signatures" Proceedings of the 1989 International joint conference nevrnal Networks (ISCNN-89). Vol. 1, June 1989 pp.33-37.
13. B. Kosko. "Foundation of Fuzzy estimation theory" Ph.D. thesis, Deptt. of Electrical Engg. University of Californic Irvine June, 1987.
14. B. Kosko "Fuzzyiness Versus Probability" *International Journal of genera systems*, Vol. 17,No.2, 1990, PP 211-240.
15. J.A. Freeman and D.M. Skapura. "Neural Network, Algorithms applications and programming techniques, computation and neural system series california Institute of Technology 2002 (Book).
16. D.L. Hudson and M.E. Coheu "Neural Networks and artificial intelligance for bio medical Engineering. IEEE Press series in Biomedical Engg. Prentice hall of India private Ltd. New Delhi, 2001 (Book).
17. M.T. Hagan, H.B. Demuth and Mark Beale "Neuml Network Design Vikas Publishing house New Delhi I 996 (Book).
18. Express computer: Rakesh Mathur. India trends Business Intelligence Market Poised for take off Indian companies switch to BI tools asthey seak to use their data more intelligently page 4 ex press computer, *Trend micro TM Intuitive Information security* Vol. 13, No. 45 January 13,2003.
19. Express computer: Ketan Pandya Focus Building Blocks for a resurgent India Seven IT products companies Spawhed by the KRESIT hope to turu the tide for India page 16, express computer January I3, Vol. L, No. 45.
20. Express Computer: Rakesh Mathur IT people creating socially responsible organisations: *Incorporating corporate social responsibility in work culture* Vol. 13, No. 45 January 13, 2003.
21. L.A Zadeh "Fuzzy sets" *Information and control*, Vol 8, 1965 PP 338-353.
22. Bart Kosko "Neural Networks and Fuzzy systems. A dynamical systems approach to machine Intelligence", Prantice Hall of India Private Limited. New Delhi. 2000.
23. Riza, C. Berkan and S.L. Trubatch. Fuzzy system design principles Building Fuzzy IF-THEN Rule Bases IEEE. Press, Standard publishers Distributors Delhi, 2000 (Book).